Elmendorf Air Force Base Groundwater Monitoring Program

FACT SHEET - APRIL 2002

Elmendorf Air Force Base (AFB) has implemented a comprehensive strategy to clean up contaminated groundwater on base and to ensure these cleanup efforts are protective of human health and the environment. The cleanup strategy focuses on three major aspects:

- monitored natural attenuation of groundwater,
- institutional or land use controls, and
- natural and man-made wetlands adjacent to Ship Creek.

The purpose of this fact sheet is to describe each component of the groundwater cleanup strategy and how each contributes to the safety of the water migrating from the base.

Background

In the early 1980s the Department of Defense developed the Environmental Restoration Program (ERP) to identify and correct contamination resulting from past operations. Elmendorf AFB started its ERP process in 1983, and in August 1990, the base was placed on the Environmental Protection Agency (EPA) National Priorities List (NPL). Since 1983, record searches and investigations have identified 85 potentially contaminated sources on the base. These sources included landfills used from the early 1940s to late 1960s, fuel spills, and underground storage tanks.

By 1996, Elmendorf had completed intensive site investigations to determine the extent of contamination and signed records of decision (RODs), which outline cleanup actions to be taken. Several RODs require groundwater monitoring as part of the remedy, and annual groundwater monitoring has been underway since 1996. As part of the cleanup plans, Elmendorf AFB has implemented a comprehensive groundwater strategy.

Groundwater

The base has two aquifers, which are basically layers of water-saturated soil. The aquifers are separated by an impermeable layer of silt and clay. The deep groundwater aquifer under the silt and clay formation on base is not contaminated. This lower aquifer supplies water for industrial purposes, for the power plant and for the fish hatchery.

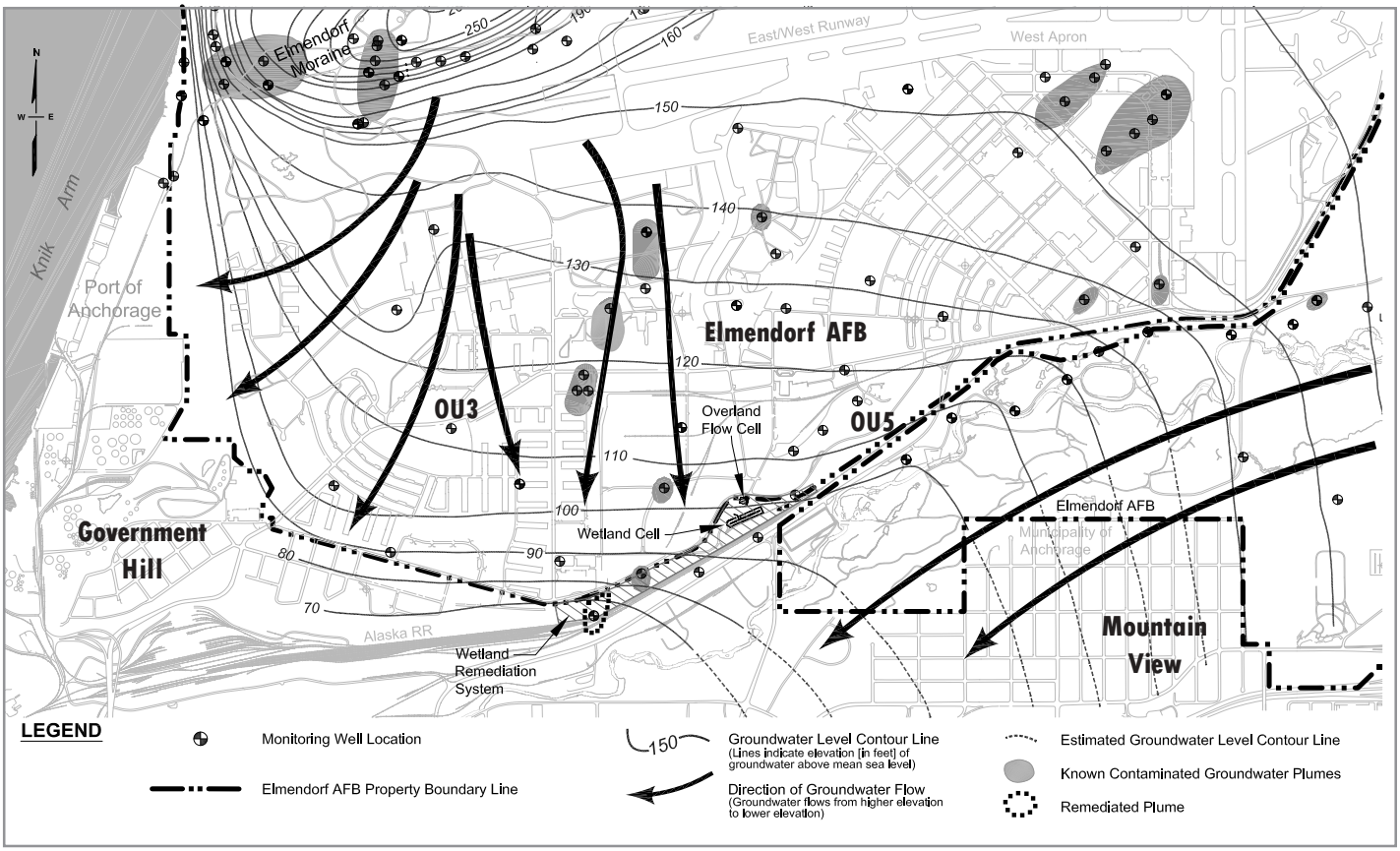
The upper aquifer, also known as the shallow aquifer, is located 10 to 50 feet below the surface of the ground and has zones of contamination. These contaminated zones or plumes are the result of accidental fuel spills or past industrial practices that are no longer allowed. While cleanup efforts and natural cleansing processes take place, Elmendorf monitors the water to ensure that people and the environment are protected. The plumes are getting smaller and Elmendorf environmental managers expect the base groundwater will be clean within about 25 years. The contaminated groundwater does not affect any drinking water on or off the base.

Monitored Natural Attenuation

Natural attenuation breaks down contaminants in groundwater through biological, chemical and physical processes. A long-term program to monitor the effectiveness of natural attenuation has been implemented and ongoing for five years. The monitoring program has been designed to ensure that both basewide groundwater concerns and those linked to a specific contaminated site are addressed. It also makes sure the remedies taken are protective of human health and the environment.

This program involves sampling 100 groundwater monitoring wells one or two times a year. Results are evaluated and appropriate adjustments are made to the program. If new or increased contamination is found and validated by follow-up

Collecting groundwater samples for chemical analysis



Map of Elmendorf Air Force Base depicting monitoring wells in the basewide monitoring program, groundwater flow contours and direction, and base boundary

tests, additional wells are added to the monitoring program. For example, a strategically placed monitoring well was added to monitor residual contamination following cleanup of a 1997 fuel pipeline leak near the East/West Runway. Monitoring in some wells may be stopped if monitoring of those wells is no longer needed for the protection of human health and the environment, based on criteria established by the Air Force, the Alaska Department of Environmental Conservation and the EPA.

Site investigations completed in the 1990s and groundwater monitoring program findings helped delineate several plumes of contamination (shown on the map above). These plumes contain fuels and/or a degreasing solvent called trichloroethene (TCE) and are closely monitored. The plumes are primarily located in the industrial area of the base and are generally moving southward towards Operable Unit (OU) 5 and Ship Creek. Groundwater monitoring data collected through 2000 has confirmed natural attenuation is generally reducing the size of the plumes and levels of contamination. However, the base is closely monitoring one TCE plume in the eastern portion of OU5, which originated from a source near the runways. Because of the proximity of this plume to Ship Creek and the current levels of TCE contamination, the base is increasing monitoring efforts to verify natural attenuation is working in this area. TCE concentrations in monitoring wells near Ship Creek have been detected at very low levels and these levels have no adverse impact on human health and the environment.

Wetland Remediation System

During the site investigations, Elmendorf AFB discovered several groundwater seeps within OU5 that were contaminated with TCE and fuels. The sources of this contamination were the groundwater plumes shown on the map. The seeps in the eastern area of OU5 flow into a beaver pond where natural attenuation degrades the contamination before it reaches Ship Creek. In the western portion of OU5 there are several groundwater seeps, which are also contaminated with TCE and fuel. To prevent any contamination from reaching Ship Creek, the Air Force leased land from the Alaska Railroad Corporation and designed and built a wetland remediation system in 1996-1997.

This “engineered” wetland is at the base of the bluff overlooking Post Road. It works in conjunction with nearby marshy areas to capture contaminated water as it leaves the aquifer at seeps in the bluff. The water is collected by wells and pumped up to the top of the bluff. There, some of the contaminants naturally dissipate as the water flows through a shallow, gravel-filled trough. The water then flows down to the wetland. Plants and microorganisms in the wetland’s multi-channeled water maze naturally remove any remaining contaminants before the now-clean water is discharged to Ship Creek. The

system, which operates year-round, treats approximately 30 million gallons of contaminated groundwater per year. To confirm the quality of the water leaving the wetland, the Air Force collects samples quarterly. All samples of this water have been clean. In addition, water samples are taken from Ship Creek twice per year, and all of these samples have been clean.

Elmendorf also periodically samples groundwater seeps in OU5. In 2001, this monitoring revealed TCE in three additional groundwater seeps coming from the bluff in the western portion of OU5. The TCE was found at levels up to two times above those suitable for drinking water. However, the amount of TCE was so small (10 parts per billion or the equivalent of 10 drops of TCE in an Olympic-size swimming pool), downgradient sampling results suggested that the newly discovered TCE is able to naturally attenuate to within drinking water standards within a few yards downgradient.

The Elmendorf restoration team is investigating the source of the TCE groundwater seeps. These seeps will continue to be monitored and if necessary the groundwater seep collection system can be modified so the wetland system can treat the additional seeps.

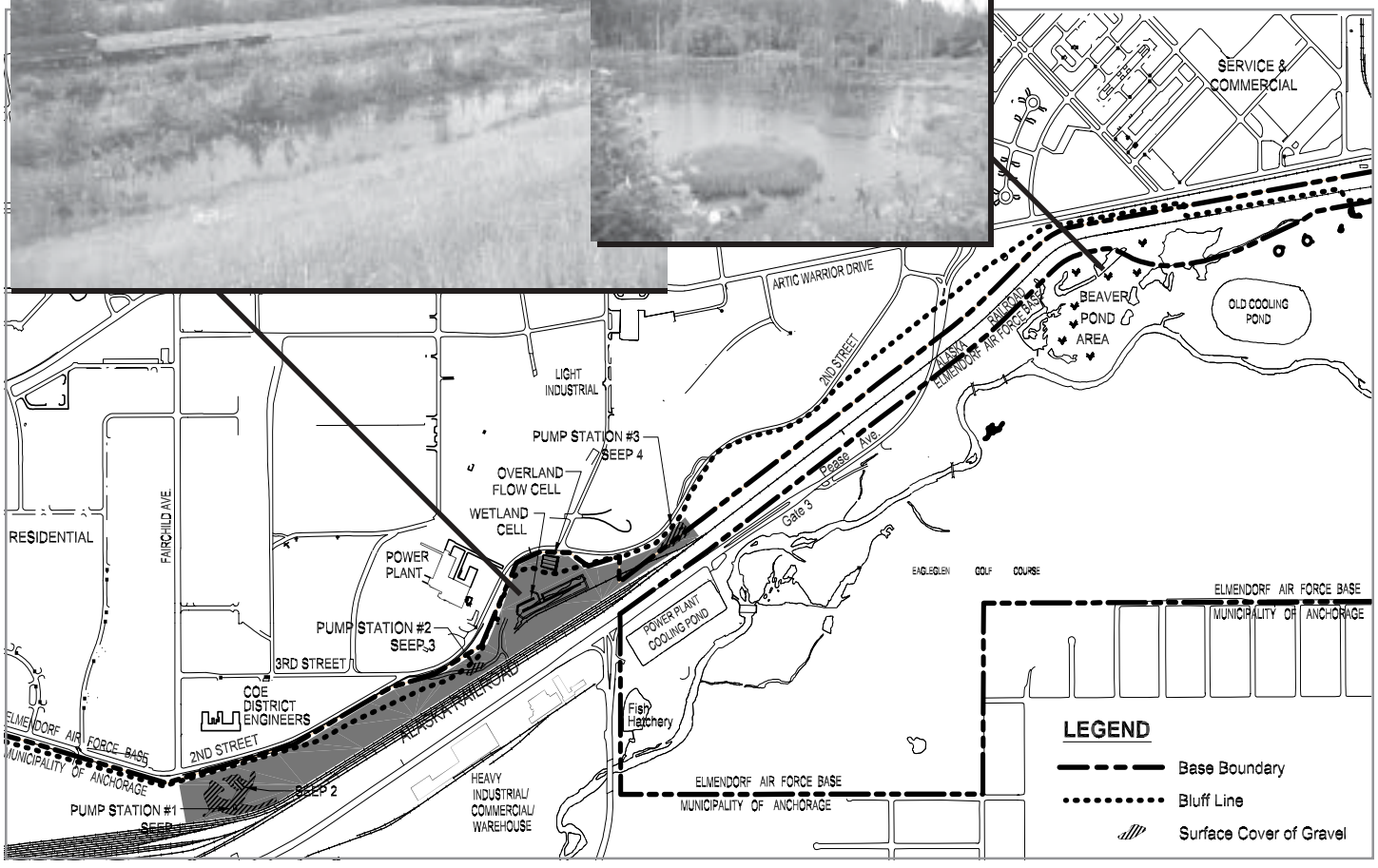
Institutional Controls

Institutional controls (ICs) are selected as a part of the cleanup remedy at locations where contamination remains at levels that prevent unrestricted and unlimited use of the site. The purpose of an IC is to prevent exposure to contaminated soil or groundwater. On Elmendorf AFB, ICs include restricted use areas, such as old landfills, and a basewide prohibition on the use of groundwater from the upper aquifer south of the Elmendorf Moraine. The western edge of the moraine is visible on the map on the opposite page. This glacial ridge is the northern boundary of the upper aquifer and stretches from Knik Arm northeast toward Fort Richardson. The ICs only cover Elmendorf AFB.

To ensure compliance with ICs, Elmendorf's Environmental Flight reviews all requests to excavate on the base and all new project designs. The Environmental Flight also monitors IC compliance by base tenants and leaseholders. The institutional controls are described in detail in the Environmental Restoration Program's Management Action Plan (MAP). This document is available at the Elmendorf Information Repositories described on the last page of this fact sheet.

Wetland Remediation System

Beaver Pond Area



Map Showing OU5 Wetland Remediation System

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Information Repositories

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3150 C Street, Suite 100 - Anchorage, AK 99503
(907) 272-7547

University of Alaska Anchorage - Consortium Library
College of Arts and Sciences Building
3211 Providence Drive - Anchorage, AK 99508
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Glossary

Institutional Controls: Policies and procedures established to control access and exposure to the soil, air and water. Controls can be placed on one specific environmental cleanup site, on a group of sites or basewide. These can take many forms, from water use limitations, to controls on future land use.

Natural Attenuation: Natural physical, chemical, and biological processes that break down contaminants in soil and water.

Operable Unit (OU): A term used to describe a certain portion or study area within an NPL site. An OU may be based upon a particular type of contaminant, contaminated media (such as soil or water), source of contamination or geographical location.

Trichloroethene (TCE): A solvent historically used in cleaning operations.